

FRESHWATER TRICLADS (TURBELLARIA) OF NORTH
AMERICA. XIV. *POLYCELIS MONTICOLA*,
NEW SPECIES, FROM THE SIERRA
NEVADA RANGE IN CALIFORNIA

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Abstract.—A new species of *Polycelis*, *P. monticola*, is described. The principal distinguishing characters of the species are in the anatomy of the copulatory apparatus. The species has a blunt penis papilla and the ejaculatory duct opens on the ventral side of the papilla instead of at its tip.

In the course of a study on the distribution and ecology of freshwater triclads or planarians in the Lake Tahoe Basin, California and Nevada, one of us (AMH) found representatives of the genus *Polycelis* to be the most common planarians inhabiting springs and creeks of the basin. As *Polycelis sierrensis* Kenk was known to be present in the area (Kenk 1973:11), it was natural to assume that all the specimens observed belonged to that species. Upon closer examination, however, and after studying the anatomy of sexually mature individuals, it was discovered that some of them belonged to a new species.

Polycelis monticola, new species

Type-material.—All type-specimens have been deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Holotype: whole mount of anterior end and sagittal sections of posterior part on 7 slides (USNM 71762). Paratypes: whole mount and sagittal sections of 5 specimens, on 44 slides (USNM 71763-71767).

External features (Fig. 1).—In general external appearance the species conforms with the other two American species of *Polycelis*, *P. coronata* and *P. sierrensis*. Fully grown specimens are up to 20 mm long and 2.5 mm wide. The anterior end is truncate, with a convex frontal margin and a pair of rather pointed auricles extending anterolaterally. Behind the auricles, the lateral body margins gradually widen, soon reach their greatest width, run parallel for some distance, then converge again behind the pharyngeal region, to meet at the bluntly pointed posterior end. The color of the animal is a variable shade of brown, somewhat darker on the dorsal surface than ventrally. The numerous small eyes are arranged along the margins of the head and the anterior fourth of the prepharyngeal region. They are rather widely scattered on the head and may be absent or scarce on the bases of the auricles (Fig. 2A). In the genus *Polycelis*, the individual eyes or ocelli lack the unpigmented spots located above each ocellus, such as are found in *Dugesia* or *Phagocata*. In darkly colored specimens it is therefore often difficult to see the small pigment cups of the individual ocelli through the colored tissues covering them. The pharynx is rather long, measuring about one-fourth the body length; its root is situated at the middle of the body.

Anatomy.—The distinguishing characters of the species are in the morphology

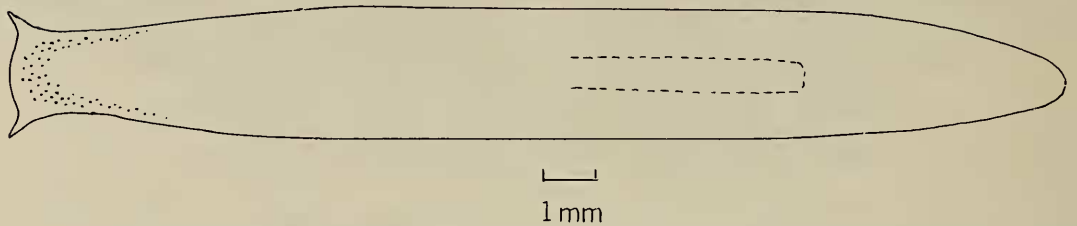


Fig. 1. *Polycelis monticola*, outline drawing of living specimen, indicating the location of eyes and pharynx.

of the reproductive system. The gonads and gonoducts are very similar to those of other species of the genus. The ovaries are situated on the medial side of the ventral nerve cords at about the level of the fifth lateral branches of the anterior intestinal trunk. The numerous testicles are arranged in a pair of longitudinal bands beginning immediately behind the ovaries and extending posteriorly to the root of the pharynx. They are predominantly ventral, located chiefly medially to the ventral nerve cords, and connect with the pair of thin anterior sperm ducts or vasa deferentia that run along the medial side of the cords. In the region of the pharynx, the sperm ducts are widened, forming the false seminal vesicles or spermiductal vesicles that proceed posteriorly to their entrance into the penis bulb.

In the copulatory apparatus (Fig. 3), the gonopore (*gp*) leads into a short canal that continues dorsally into the bursal duct (*bd*) and on the right side into the male atrium (*am*). At the junction of these canals there is no widened cavity that could be termed a common atrium. The musculature of the male atrium is of the common type, not excessively developed, and consists of a layer of circular fibers adjoining the epithelial lining, followed by a layer of longitudinal muscles. The penis consists of an anterior bulb of moderate size and a plug-shaped or bluntly conical papilla projecting into the male atrium. The bulb contains a large cavity of irregular outline, the seminal vesicle (*vs*), from which a narrower canal, the ejaculatory duct (*de*), proceeds to open ventrally to the tip of the papilla. Numerous gland ducts (*gl*), with a granular, slightly eosinophilic secretion, enter the



Fig. 2. Photographs of anterior ends of preserved specimens, $\times 20$: A, *Polycelis monticola* from Tahoe Paradise; B, *P. sierrensis* from spring near Sagehen Creek Biological Station, Nevada County, California.

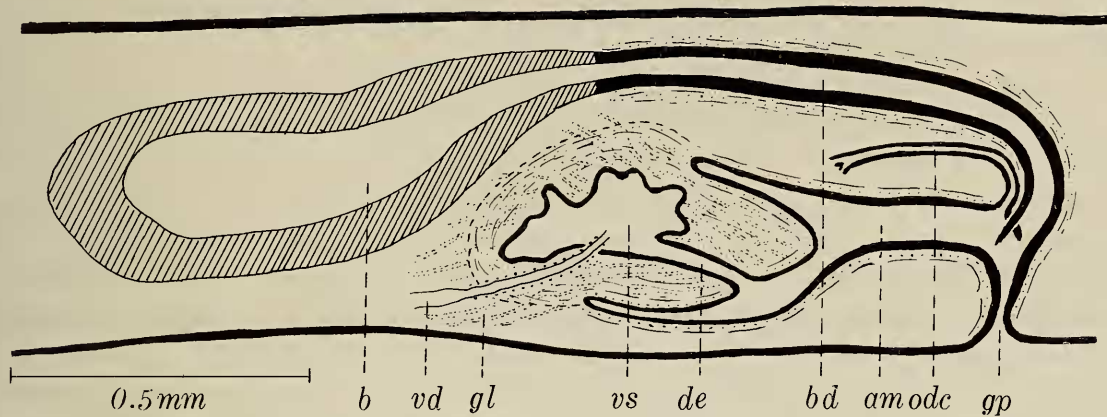


Fig. 3. *Polycelis monticola*, semidiagrammatic view of copulatory apparatus in sagittal section. *am*, male atrium; *b*, copulatory bursa; *bd*, bursal duct; *de*, ejaculatory duct; *gl*, gland ducts; *gp*, gonopore; *odc*, common oviduct; *vd*, vas deferens; *vs*, seminal vesicle.

penis bulb from the surrounding mesenchyme and apparently open into both the penial lumen and the outer surface of the penis papilla. The two sperm ducts (*vd*) enter the penis bulb laterally and open separately into the seminal vesicle. The oviducts or ovovitelline ducts ascend dorsally in the region of the copulatory complex, approach the midline, and unite above the male atrium to form the common oviduct (*odc*), that curves posteriorly and opens into the end part of the male atrium close to its junction with the bursal duct.

The copulatory bursa (*b*) is a large sac, rather elongate in well extended specimens. Its duct, the bursal stalk (*bd*), proceeds posteriorly above the penis and male atrium, slightly left of the midline, then curves ventrally toward the gonopore. The duct is surrounded by a strong muscle coat consisting of intermingled circular and longitudinal fibers.

None of the epithelia of the copulatory complex is infranucleate.

Distribution and ecology.—Sexually mature, and therefore reliably identifiable, specimens could be examined only from a small spring at Tahoe Paradise, El Dorado County, California. The spring is located about 250 m east of State Road 89, 2 km south of its junction with U.S. Highway 50 (U.S. Geological Survey, Primary base series map Echo Lake, California, Forest Service No. 535-4C, NE quarter of NW quarter of Section 5, Township 11 N, Range 18 E). Many individuals of *Polycelis*, however, were found in other springs and creeks of the area, which had their reproductive systems developed only in the anlage stage, not sufficiently differentiated to separate them from other species of the genus.

Another, though less dependable character, the scattered arrangement of the eyes on the head region of *P. monticola*, distinguishes it to some extent from the sympatric *P. sierrensis*. This character indicates a wider distribution of the new species in the Lake Tahoe area:

El Dorado County, California: Two more springs at Tahoe Paradise; spring and a small creek at Benwood Meadows; Heavenly Valley Creek; Cold Creek.

Douglas County, Nevada: Springs on Foothill Road, Gardnerville.

The reproduction of *P. monticola* appears to be both sexual and asexual. Specimens with regenerating anterior or posterior ends, indicating previous fissions, were observed at all seasons. Individuals with sexual structures were likewise

seen at all seasons, but no egg capsules or cocoons were found at any time despite diligent searching.

Polycelis monticola was active in the Tahoe Paradise spring all year-round and was collected at water temperatures varying between 1.1° and 16.0°C, pH 7.0. However, the species is very sensitive to temperature fluctuations. When removed from the spring and taken to the laboratory, animals often disintegrated. This condition was exacerbated during the warmer months, presumably when they were at the upper limits of their temperature tolerance. Repeated attempts to send live specimens from California to Washington, D.C., in vacuum-insulated bottles shipped by air mail special delivery, were successful only a few times.

Taxonomic position.—*Polycelis monticola* is closely related to *P. coronata* (Girard), from which it differs chiefly in the anatomy of the male copulatory organ. In *P. coronata* the penis papilla is conical and the opening of the ejaculatory duct is at the rather pointed tip of the papilla. *Polycelis monticola* has a plug-shaped or bluntly pointed papilla and the opening of the ejaculatory duct is ventral to the tip. In an earlier paper (Kenk 1972:25–27), three subspecies of *P. coronata* were distinguished. Two of them were separated only by the differentiation of the bursal duct, which in *P. c. coronata* is divided into an anterior glandular and a posterior muscular section, while in *P. c. borealis* Kenk it is muscular throughout its length. Recent investigations have shown that various intergrades exist between these two conditions. It is therefore best to abolish this distinction between the two subspecies and to consider *P. c. borealis* to be a synonym of *P. c. coronata*. The third subspecies, *P. c. brevipenis* Kenk, distinguished by an elongated penis bulb and a short penis papilla, seems to be a valid taxon.

Another species of *Polycelis*, *P. sierrensis* Kenk (1973), occurring also in the Lake Tahoe area, differs from *P. monticola* by having the male atrium surrounded by a very thick muscle coat, which places it in the subgenus *Seidlia*. In life it can hardly be separated from *P. monticola* except that the band of eyes on the head is more marginal in *P. sierrensis*, while in *P. monticola* the eyes are scattered on the surface of the head (Fig. 2) and the auricles are more acutely pointed.

Etymology.—The name of the new species, *monticola* (Latin, inhabitant of mountains), refers to its occurrence at high altitudes.

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